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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/603,118	06/22/2000	Koichi Nitta	KYOW-900-(US)	9026

7590

01/28/2004

Edward B Weller  
Gray Cary Ware & Freidenrich LLP  
1755 Embarcadero Road  
Palo Alto, CA 94303-3340

EXAMINER
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LOUIE, WAI SING

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 01/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/603,118

Applicant(s)

NITTA ET AL.

Examiner

Wai-Sing Louie

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,8,17 and 20-27 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21-23 and 25-27 is/are allowed.
- 6) ☒ Claim(s) 1,8,17,20 and 24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_. 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama et al. (US 5,798,537) in view of Okazaki (US 5,990,500) and Hayafuji et al. (US 5,701,321).

With regard to claims 1 and 8, Kamiyama et al. disclose a blue light semiconductor light-emitting device (col. 2, line 66 to col. 7, line 48 and fig. 2) comprising:

- A conductive semiconductor substrate 100 (fig. 2);
- An electrode 106 of one conductivity type, which is formed on the substrate 100 (fig. 2);
- A light-emitting layer 103 formed on the reflective layer 106 to emit light, having a double-heterostructure in which an active layer 103 is sandwiched between first and second cladding layers 102 and 104 containing  $\text{In}_x\text{Ga}_y\text{Al}_{1-x-y}\text{N}$  (col. 3, line 66 to col. 4, line 43 and fig. 2);
- A transparent electrode 105 formed on the light-emitting layer (col. 4, lines 30-35);

- Kamiyama et al. do not disclose a reflective layer formed on the electrode.

However, it is well known in the art to have a reflective layer in a LED to reflect light such as disclosed in Hayafuji et al. (Hayafuji layer 11 of fig. 1). Hayafuji et al. disclose the reflective layer has a two-layered structure made up of a transparent conductive film 11 and a metal layer 14 (Hayafuji fig. 1). Therefore, it would have been obvious for the one with ordinary skill in the art to have a reflective layer formed on the electrode in Kamiyama's device;

- Kamiyama et al. do not disclose a bonding electrode formed on the transparent electrode 105. However, Okazaki discloses a bonding pad 12 formed on the ITO electrode layer 10 (Okazaki col. 4, lines 64-65 and fig. 1). Okazaki teaches the bonding pad 12 and transparent electrode combination would reduce the sheet resistance and provide uniform current injection along the emission surface (Okazaki col. 3, lines 8-16). Therefore, it would have been obvious at the time the invention was made to modify Kamiyama's device with the teaching of Okazaki to provide a bonding pad on the transparent electrode in order to reduce the sheet resistance and provide uniform current injection along the emission surface.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama et al. (US 5,798,537) in view of Bour et al. (US 5,977,612).

With regard to claim 20, Kamiyama et al. do not disclose the shape of the light-emitting element is a polygonal prism having at least five corners or a circular cylinder. However, Bour et

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al. disclose a cylindrical LED on a hexagonal crystallite structure 200 and a circular light-emitting element 202 (Bour fig. 2a & 2b). Bour et al. teach the conventional LED structures require a separation between LED structures (Bour col. 2, lines 1-4), but an array of crystallites could be formed in a single substrate (Bour col. 3, lines 1-15) by taking advantage of the natural lattice structure of III-V compound (Bour col. 2, line 48-60). Therefore, it would have been obvious to one with ordinary skill in the art to modify Kamiyama's device with the teaching of Bour to have a hexagonal or cylindrical light-emitting structure in order to form a high-density integrated device.

Claims 17 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiyama et al. (US 5,798,537) in view of Paoli et al. (US 5,138,625).

With regard to claims 17 and 24, in addition to limitation disclosed in claim 1 above, Kamiyama et al. also discloses:

- Kamiyama et al. do not disclose an interface of the contact layer in contact with the first cladding layer is corrugated to have a gradient index and light emitted by the light-emitting layer is reflected by the interface. However, Paoli et al. disclose a LED having a corrugated interface between the contact layer 300 and cladding layer 296 (Paoli col. 12, lines 7-41 and fig. 12). Paoli et al. teach the V-groove (recessed surface) of the corrugated interface polarizes the light beam parallel to the plane of incidence (Paoli col. 6, lines 1-9 and col. 12, lines 1-18). Therefore, it would have been obvious to one with ordinary skill in the art to modify Kamiyama's device with the teaching of Paoli et al. to provide a corrugated

interface between the contact layer and cladding layer. Doing so would control the polarization of the light emission.

***Allowable Subject Matter***

Claims 21-23, and 25-27 are allowed. The following is an examiner's statement of reasons for allowance:

With regard to claim 21-23 and 26-27, References Kamiyama et al. and Suzuki et al. do not disclose the photonic crystal layer as recited in claim 21-23 and 25-27. Therefore, Schetzina and Suzuki et al. do not disclose the claimed invention.

With regard to claim 25, Schetzina does not disclose a substrate with a rounded edge fused to a photonic crystal layer and claim 25 is allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Response to Arguments***

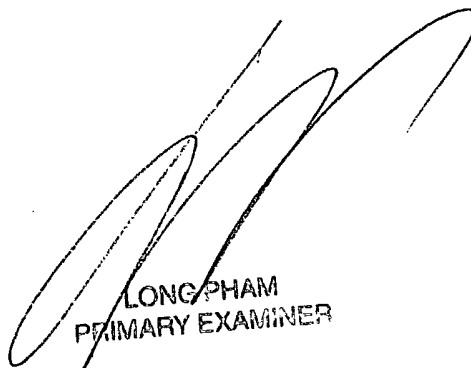
Applicant's arguments with respect to claims 1, 8, 17, and 20-27 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



LONG PHAM  
PRIMARY EXAMINER

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (571) 272-1709.

The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1562.

wsf

January 23, 2004